Observations of Eclipses, Occultations, and Phenomena of Jupiter's Satellites, made with the 8-inch Equatoreal (Cooke) at the Adelaide Observatory, South Australia. By C. Todd, Esq., Director of the Observatory.

Longitude, $9^h\ 14^m\ 21^s{\cdot}3$ E. | Latitude, $34°\ 55'\ 33''{\cdot}8$ S.

1878.

Ref. No.	Date 1878.	Observer	Phenomenon.	Phase of Phenomenon.	Adelaide Mean Time. h m s	Corresponding Greenwich Mean Time. h m s	Time by *Nautical Almanac.* h m s	Apparent Error of *Nautical Almanac.* m s	Power.
1	July 5	T	IV. Sh. E.	About bisected	10 0 32·31	0 46 11·01	0 48	...	200
2	,,	,,	IV. Tr. I.	External contact	10 5 7·30	0 50 46·00	...	...	,,
3	,,	,,	IV. Sh. E.	Disappeared	10 5 22·30	0 51 1·00	...	...	,,
4	,,	,,	IV. Tr. I.	Bisected	10 12 24·29	0 58 2·99	0 46	...	,,
5	,,	,,	,,	Internal contact	10 16 49·28	1 2 27·98	...	...	,,
6	July 7	T	I. Oc. R.	First seen	8 36 17·77	23 21 56·47			
7	,,	,,	,,	About bisected	8 36 37·77	23 22 16·47	23 24	...	,,
8	,,	,,	,,	External contact	8 39 7·77	23 24 46·47			
9	July 21	T	I. Ec. D.	Disappearance	9 43 31·36	0 29 10·06	0 28 45	−0 25·05	,,
10	July 22	T	I. Sh. E.	Internal contact	9 5 0·06	23 50 38·76			
11	,,	,,	,,	About bisected	9 8 53·55	23 54 32·25	23 57	...	,,
12	,,	,,	,	Limb complete	9 9 49·55	23 55 28·25			
13	July 22	T	I. Tr. E.	Internal contact	9 10 36·55	23 56 15·25			
14	,,	,,	,,	Bisection	9 12 37·05	23 58 15·75	0 2	...	,,
15	,,	,,	,,	External contact	9 15 38·05	0 1 16·75			

16	July 22	T	II.	Ec. D.	Last seen	10 31 18·95	1 16 57·65		1 17 3	+0	5·35	,,	
17	July 23	T	I.	Oc. R.	External contact	6 38 12·50	21 23 51·20		21 18		...	,,	
18	July 26	T	III.	Tr. I.	External contact	8 14 0·35	22 59 39·05						
19	,,	,,		,,	Bisected	8 19 13·35	23 4 52·05		23 3		...	,,	
20	,,	,,		,,	Internal contact	8 23 58·35	23 9 37·05						
21	July 26	T	III.	Sh. I.	First seen	8 28 38·25	23 14 16·95						
22	,,	,,		,,	Bisected	8 29 38·25	23 15 16·95		23 11		...	,,	
23	,,	,,		,,	Internal contact	8 32 28·25	23 18 6·95						

Remarks.

Ref. No.

1 Late; clouded.

2 Good.

3 Pretty good.

4 Late; doubtful; clouds passing, frequently hiding planet.

5 Very good.

Observations interfered with by passing clouds, but splendid glimpses occasionally, the planet and satellites being splendidly defined, the latter, excepting the fourth, having well-defined disks. The fourth satellite, before ingress, was noticed as faint, and, when on the planet's disk, it appeared as a black, well-defined spot on the northern white belt, almost as black as its shadow, which was then passing off the opposite limb. The transit occurred on the north bright belt.

6, 7, 8 Not good; planet very badly defined.

9 Very good, but satellite disappearing close to the limb might cause the time noted to be a little early.

Ref. No.

10, 11, 12, 13, 14 Clouds interfering; the shadow and the satellite traversed the north edge of the north equatoreal white belt, and were almost touching each other.

15 Very good observation.

16 Observation doubtful; clouds continually obscuring planet, which, however, emerged just before time noted, and I then caught sight of satellite as a mere speck close to, but not touching the edge or limb of planet; the time noted was when it disappeared.

17 Late; not good; planet dreadfully ill defined and unsteady.

18 Not very good.

20 Considered good.

21 Late; clouds interfering.

23 Difficult.

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24	July 26	R	III. Tr. E.	Bisection	11 51 57·85	2 37 36·55	2 41	...	200
25	,,	,,	III. Sh. E.	Internal contact	11 55 17·85	2 40 56·55	...	...	,,
26	,,	,,	III. Tr. E.	External contact	11 56 7·84	2 41 46·54	...	...	,,
27	,,	,,	III. Sh. E.	Bisected	11 56 49·34	2 42 28·04	2 47	...	,,
28	,,	,,	,,	Limb complete	12 1 37·83	2 47 16·53	...	...	,,
29	July 29	T	I. Tr. I.	External contact	8 26 26·30	23 12 5·00			
30	,,	,,	,,	Bisection	8 32 3·80	23 23 42·50	23 25	...	,,
31	,,	,,	,,	Internal contact	8 41 19·80	23 26 58·50			
32	July 29	T	I. Sh. I.	First seen	8 45 54·30	23 31 33·00			
33	,,	,,	,,	About bisected	8 47 38·30	23 33 17·00	23 32	...	,,
34	,,	,,	,,	Internal contact	8 49 46·30	23 35 25·00			
35	July 29	T	I. Tr. E.	Internal contact	10 54 50·00	1 40 28·70			
36	,,	,,	,,	About bisected	10 57 5·00	1 42 43·70	1 45	...	,,
37	,,	,,	,,	External contact	11 0 8·05	1 45 47·20			
38	July 29	T	I. Sh. E.	Internal contact	11 1 4·00	1 46 42·70			
39	,,	,,	,,	About bisected	11 2 13·00	1 47 51·70	1 52	...	,,
40	,,	,,	,,	Limb complete	11 4 31·00	1 50 9·70			
41	Aug. 7	T	I. Tr. E.	Internal contact	7 4 45·68	21 50 24·38			
42	,,	,,	,,	About bisection	7 6 58·68	21 52 37·38	21 55	...	,,
43	,,	,,	,,	External contact	7 9 0·18	21 54 38·88			

44	Aug. 9	R	II.	Ec. R.	First seen	7 48 25·60	22 34 4·30	22 34 52	+0 47·70	,,
45	,,	,,		,,	Full blaze	7 54 15·10	22 39 53·80	...	...	,,
46	Aug. 13	T	I.	Oc. D.	External contact	9 23 21·67	0 9 0·37			
47	,,	,,		,,	About bisected	9 25 12·17	0 10 50·87	0 11	...	,,
48	,,	,,		,,	Internal contact	9 27 58·67	0 13 37·37			
49	Aug. 13	T	III.	Ec. R.	First seen	9 54 32·10	0 40 10·80	0 43 28	+3 17·20	,,
50	,,	,,		,,	About bisection	9 58 49·10	0 44 27·80	...	...	,,
51	,,	,,		,,	Full blaze	10 1 59·10	0 47 37·80	...	...	,,
52	Aug. 13	T	I.	Ec. R.	First seen	12 12 0·80	2 57 39·50	2 57 48	+0 8·50	,,
53	,,	,,		,,	Full blaze	12 16 33·80	3 2 12·50	...	...	,,
54	Aug. 21	T	I.	Tr. In.	External contact	8 16 25·80	23 2 4·50			
55	,,	,,		,,	About bisected	8 19 22·30	23 5 1·00	23 5	...	,,
56	,,	,,		,,	Internal contact	8 22 2·78	23 7 41·48			

Remarks.

Ref. No.

28 When shadow disappeared the satellite was only about half its diameter outside the limb of the planet.

31 Satellite entered on northern edge of equatoreal bright belt.

32 Limb slightly indented.

35

36 Considered good.

37

39 Appearing as a cup to satellite.

41

42, 43 Definition wretched; planet very unsteady; limb boiling; lost egress of shadow by clouds.

Ref. No.

44 Very exact; seen instantly; definition good.

46, 47, 48 Very exact; planet and satellite very well defined; occultation complete at limb; satellite disappeared behind bright equatoreal belt, and a little south of equator.

49, 50, 51 Definition splendid; satellite well defined; and at time noted of bisection it appeared as a half-moon.

54 Not very good; planet unsteady.

56 Very good.

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57	Aug. 21	T	I. Sh. I.	First seen	8 58 55·20	23 44 33·90			
58	,,	,,	,,	Bisected	8 59 29·70	23 45 8·40	23 44	...	200
59	,,	,,	,,	Internal contact	9 1 33·70	23 47 12·40			
60	Sept. 25	T	III. Ec. R.	First seen	10 0 21·38	0 46 0·08	0 49 40	+3 39·92	,,
61	,,	,,	,,	Full blaze	10 12 38·38	0 58 17·08	...	...	,,
62	Sept. 30	T	I. Ec. R.	First seen	7 9 57·13	21 55 35·83	21 55 50	+0 14·17	,,
63	,,	,,	,,	Full blaze	7 13 7·63	21 58 46.33	...	...	,,
64	Oct. 1	T	II. Oc. D.	External contact	9 53 25·20	0 39 3·90			
65	,,	,,	,,	About bisected	9 55 28·20	0 41 6·90	0 41	...	,,
66	,,	,,	,,	Internal contact	9 57 49·20	0 43 27·90			
67	Oct. 2	T	III. Oc. R.	First seen	8 54 39·30	23 40 18·00			
68	,,	,,	,,	About bisection	8 57 28·30	23 43 7·00	23 46	...	,,
69	,,	,,	,,	External contact	9 1 34·30	23 47 13·00			
70	Oct. 2	T	III. Ec. D.	Disappearance	10 34 47·50	1 20 26·20	1 20 52	+0 25·80	,,
71	Oct. 5	T	IV. Ec. D.	Minute speck	8 20 38·62	23 6 17·32	...	...	,,
72	,,	,,	,,	Still visible	8 22 15·12	23 7 53·82	...	...	,,
73	,,	,,	,,	Disappearance	8 22 37·62	23 8 16·32	23 10 19	+2 2·68	,,
74	Oct. 21	T	I. Oc. D.	External contact	9 16 19·54	0 1 58·24			
75	,,	,,	,,	About bisected	9 17 55·54	0 3 34·24	0 4	...	,,
76	,,	,,	,,	Disappeared	9 20 34·04	0 6 12·74			

77	Oct. 23	R	I.	Ec. R.	First seen	7 25 4·46	22 10 43·16	22 10 46	+0 2·84	"
78	"	"		"	Quite distinct	7 25 19·96	22 10 58·66	...	...	"
79	"	"		"	Full blaze	7 27 48·96	22 13 27·66	...	...	"
80	Oct. 28	T	I.	Oc. D.	External contact	11 13 8·22	1 58 46·92	2 0	...	"
81	"	"		"	About bisected	11 14 38·22	2 0 16·92			
82	"	"		"	Last seen	11 16 23·22	2 2 1·92			
83	Nov. 7	R	IV.	Oc. D.	External contact	8 34 29·72	23 20 8·42	23 29	...	300
84	"	"		"	About bisected	8 37 33·22	23 23 11·92			
85	"	"		"	Seen through limb	8 39 22·71	23 25 1·41			
86	"	"		"	" "	8 40 24·71	23 26 3·41			
87	"	"		"	" "	8 41 38·20	23 27 16·90			
88	"	"		"	Internal contact	8 41 54·69	23 27 33·39			
89	"	"		"	Last seen	8 41 59·69	23 27 38·39			

Remarks

Ref. No.

57 Late; limb indented.

58

59 Good observations.

62, 63 Good observations; well defined; first seen as a minute speck of light.

64

65, 66 All good; satellite disappeared behind equatoreal cloud belt.

68 Too soon; emerged from behind southern dark band, near its polar margin; satellite slightly separated from limb; observations considered good, but planet not very well defined except in glimpses.

Ref. No.

70 Very good and exact; fourth satellite very faint.

73 Considered exact, but lost sight of satellite several times before final disappearance; planet not well defined; Moon a little to east of planet.

74, 75, 76 Very badly defined, but observations pretty good; at times I thought satellites could be seen through edge of planet, but not certain.

77 Good, sharp, and exact; definition of planet fair.

78 As distinct as a small star, to the north, between two satellites to the east of No. 1.

80, 81, 82 Not very good; badly defined and very unsteady.

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90	Nov. 7	R	III. Ec. R.	First seen	10 8 33·53	0 54 12·23	0 57 39	+3 26·77	200
91	,,	,,	,,	Quite distinct	10 9 27·03	0 55 5·73	...	...	,,
92	,,	,,	,,	As bright as adjoining Sat. No. II.	10 12 39·53	0 58 18·23	...	...	,,
93	,,	,,	,,	Full blaze	10 15 0·52	1 0 39·22	...	...	,,
94	Nov. 13	T	I. Oc. D.	External contact	9 34 58·15	0 20 36·85			
95	,,	,,	,,	About bisected	9 36 51·15	0 22 29·85	0 24	...	,,
96	,,	,,	,,	Internal contact	9 38 55·15	0 24 33·85			
97	Nov. 15	R	I. Ec. R.	First seen	7 39 43·23	22 25 21·93	22 25 28	+0 6·07	,,
98	,,	,,	,,	Quite distinct	7 40 4·23	22 25 42·93	...	...	,,
99	,,	,,	,,	Full blaze	7 42 7·23	22 27 45·93	...	...	,,
100	Dec. 11	T	IV. Ec. D.	Disappearance	9 0 14·80	23 45 53·50	23 49 3	+3 9·50	125

Remarks.

Ref. No.

83 May be a little too soon.

88 Satellite passed behind white cloud belt at about lat. 25° or 30° S.

89 Fancied I saw it at 5″ after internal contact, but not very certain; definition good and steady. Looked for egress of shadow of first satellite, but could not see it.

90 Very minute speck of light; caught the first glimpse; very good observation.

91, 92, 93 Very good observations.

94, 95, 96 Mere guesswork; planet and satellites most wretchedly defined.

97, 98, 99 Not considered first-rate; hazy, and definition bad.

100 Very good; a mere speck for last minute or more; planet dreadfully ill defined.

[*The Notes of the Physical Appearance of Jupiter etc., accompanying the foregoing observations are unavoidably deferred.*—Ed.]